



AN APPLICATION OF SITUATIONAL METHOD TO COLLEGE PHYSICS TEACHING

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ABSTRACT

In this paper, we present one college physics teaching method, situational method in college physics teaching (SMCP). SMCP is composed of four modules, theme, background, interferences and roles. SMCP is expected to be an effective method to cultivate students' abilities. Exposed to the simulated situation, students learn by experiencing the process that physicists made discovery.

KEYWORDS: Situational method, college physics teaching, ability.

Introduction

One of the important goals of physics education is to cultivate the ability to find the problem, analyze the problem and solve the problem. The nature of ability, complexity, heterogeneity, creativity and situationality, determines that the cultivation of ability will be much harder than the acquisition of knowledge [1]. This paper is devoted to supplying one method for reaching this goal.

The development of ability is affected by many factors. And ability can be developed by different approaches. Students can develop and improve their ability by self-study or by accepting school education. No matter by self-study or by school education, ability development must be through and involve the student individual.

In school physics education, situational method (SM), which was developed by British applied linguists in the 1930s to the 1960s and is now applied in physics education, is an effective approach to cultivate student's ability.

Situational method in college physics teaching

It is well known that in didactic triangle, the three vertices: knowledge, students, and teachers interact in the framework of an educational system [1]. Ideally, teacher acts as a bridge between knowledge and student, and as a mentor giving comments and suggestions. In reality, teacher will play different roles and face different constraints in different countries and cultures. For example, the curriculum as well as the goal of education is determined in a given educational system. Teacher's teaching activity will accord to the goal of education and be affected by the content of the chosen textbooks.

Although facing many constraints, teacher can try his/her best to cultivate student. SM is one good and effective method. In China, SM in physics education is applied often in primary schools and secondary schools.

In this paper, we confine us to the application of situational method to physics teaching in college (SMCP). In this paper, a situation is a set of phenomena or objects to be studied, confined knowledge and theories, and interferences. The basic premises underlying SMCP are that (1) different situation demands different types of abilities, (2) skills and abilities are developed and improved by student individual through personal experiences. Exposed to the historic situation, students experience the process that the famous physicists made the discovery, envisage the obstacles that physicists met, try to feel the feelings of historic physicists, perceive thinking of them, taste the success of them. From this kind of experiences, students will learn much more than from the spoon-fed teaching in traditional classroom education.

It is evident that teaching content and teaching method should be fit to students' psychological characteristic and age characteristics. Therefore, situational method in secondary school physics teaching (SMSP) will be different from that in college physics teaching (SMCP).

SM should be compatible with students' understanding and problem-solving capabilities at different ages. Thus, situation provided by teacher will be handled according to his/her idea and based on his/her capability. Situation for SMSP will be concrete and simple. "The material furnished by way of information should be relevant to a question that is vital in the students own experience" [2]. We emphasize that situation for SMCP should be all-sided and should be of its integrity as possible as we can provide, and need not be simplified or handled because college students have enough ability to accept these information and to cope with them.

Situation designed for SMCP should be presented without any effort to soften or disguise or modify. Therefore, one situation for SMCP proposed by one teacher can be applied by others without any amendment, i.e., situation for SMCP is universal for college students.

Situation for SMCP comprises four modules:

- (1) Theme that is one phenomenon or a theory which students try to rediscover in the given situation.
- (2) Background that is the combination of physicists and their communications, confined existing knowledge and theories, limited experimental equipment.
- (3) Interferences which hindered most of physicists from discovering the results. Only few physicists overcome obstacles and discovered the new phenomenon or theory. For example, it is M. Faraday not others who discovered electromagnetic induction and Faraday's law.
- (4) Roles which students play in the situation. The roles are the chosen physicist who succeeded in making the discovery and some physicists who did not make the discovery.

Advantages and disadvantages of SMCP

Situational method in college physics teaching has many advantages:

- Traditional teaching is teacher-oriented but SMCP is student-oriented. Traditional classroom teaching has restricted students' innovative thinking and creativity while SMCP is an effective approach.
- Every individual creates his or her own internal interpretation of the real world [3], i.e., all students do not learn in the same way. Therefore, different student will learn different content from the same situation not as traditional classroom teaching in which student obtain the same processed knowledge from teacher.
- How students hear and interpret the material presented to them is heavily dependent on the experiences [4]. Through role-playing and imitating the famous physicists in SMCP, students can gradually get rid of the bad thinking habits and develop good habits similar to physicists and cultivate the spirit and ability to explore the nature.
- Situation influences and thus constrains the physicists who must adapt his/her style of research to the situation at hand. Different from the Story-Driven Contextual Approach (SDCA) for which the story is designed and written effectively based on the history science [5], SMCP emphasizes the integrity of the historic situation, interaction between physicists and kinds of interferences. SMCP is one kind of and more than discovery learning where teachers create a problem-solving environment which allows students to question, explore and experiment [6].
- SMCP provides one platform or environment for all students to find problems, overcome obstacles, and make rediscoveries finally by themselves. Unlike students receive passively the digested information from teacher in traditional classroom, students will learn more from SMCP.
- Because the situation for SMCP is provided to be in its integrity as possible as we can. Therefore, the situation can be used universally and directly by all college students once situation is constructed. And situation can be complemented and consummated in the using.

Teaching should be compatible with students' level on a development sequence. Younger children should be taught by using concrete examples and phenomena. Therefore, SMCP is appropriate to college physics teaching but not to primary school and secondary school physics teaching. For natural sciences education, SMCP cannot substitute classroom teaching, but be an important and beneficial complement to classroom teaching. For some special purpose or some special courses, SMCP method can play dominant role in teaching.

Summary:

In this paper, situational method in college physics teaching is presented. SMCP has many advantages and will effective in college physics teaching. SMCP is the important and beneficial complement to traditional classroom teaching.

Situational method in college physics teaching is not only appropriate to college physics teaching but also to other college courses, and is suitable not only to college education but also to other kinds of adult educations.

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